


AF/3247

 TRANSMITTAL OF APPEAL BRIEF (Large Entity)	Docket No. 9101.00005 <i>JP</i>
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Re Application Of: Rein et al.

Application No. 10/718,438	Filing Date 11/20/03	Examiner McMahon, Marguerite J.	Customer No. 10534	Group Art Unit 3747	Confirmation No. 9834
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Invention: **PHOSPHATIZED AND BUSHINGLESS PISTON AND CONNECTING ROD ASSEMBLY HAVING AN INTERNAL GALLERY AND PROFILED PISTON PIN**

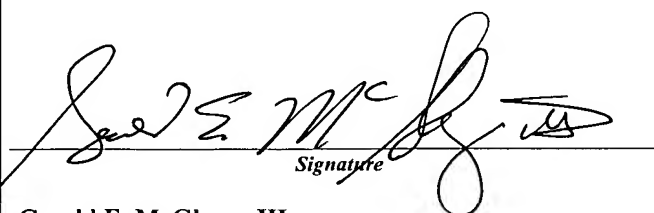
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Transmitted herewith is the Appeal Brief in this application, with respect to the Notice of Appeal filed on:
January 16, 2006

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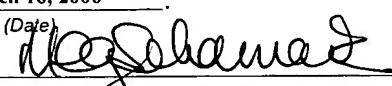
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Dated: **March 16, 2006**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Unit: 3747)
)
Examiner: McMahon, Marguerite J.)
)
Applicant(s): Rein, et al.)
)
Serial No.: 10/718,438)
)
Filing Date: November 20, 2003)
)
For: PHOSPHATIZED AND BUSHINGLESS)
PISTON AND CONNECTING ROD)
ASSEMBLY HAVING AN INTERNAL)
GALLERY AND PROFILED PISTON PIN)

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

By Notice of Appeal filed on January 16, 2006, applicants have appealed the final rejection of claims 1 - 20 communicated in the Office Action dated September 23, 2005.

Applicants submit this brief in support of that appeal.

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REAL PARTY IN INTEREST

The real party in interest is MAHLE Technology, Inc., a corporation having a place of business at 23030 Haggerty Road, Farmington Hills, Michigan 48335, as evidenced by the Assignment of the Inventors, Wolfgang Rein and Jonathan Douglas, recorded on November 20, 2003 at Reel 014742 and Frame 0489 in the United States Patent and Trademark Office.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences regarding the present application.

STATUS OF THE CLAIMS

Claims 1 - 20 were originally pending in this application. Claims 1 - 20 have been finally rejected. The rejection of claims 1 - 20 is being appealed. A clean copy of claims 1 - 20 is attached hereto at The Claims Appendix.

STATUS OF AMENDMENTS

Claims 1 - 20 were originally pending in this application. Claims 1 - 20 were rejected as being obvious and therefore unpatentable under 35 U.S.C. § 103(a) in the August 18, 2004 Office Action. In the initial Office Action, U.S. Patent No. 5,661,904 to Loughlin was the lead reference.

Claims 1, 7, 13, and 19 were amended on November 10, 2004 in response to the August 18, 2004 Office Action.

Claims 1 - 20 were later finally rejected on February 1, 2005 as being obvious and therefore unpatentable on the basis of the same references and for the same reasons set forth in

the August 18, 2004 Office Action. On April 13, 2005, the undersigned attorney for applicants and Examiner McMahon had a telephonic interview during which certain proposed amendments to the claims were discussed. Applicants filed an Amendment After Final Rejection Pursuant to 37 C.F.R. 1.116 on April 14, 2005. In this communication, independent claims 1, 7, 12, and 18 were amended to clarify that the pin has a smoothly profiled outer circumference that tapers gradually from the distal ends to the center portion. The 116 amendment was entered by the Examiner.

On June 6, 2005 the Examiner issued a subsequent non-final rejection of claims 1 - 20 as being obvious and therefore unpatentable under 35 U.S.C. § 103(a). In the June 6, 2005 Office Action, the Loughlin '904 patent was replaced with JP2-100821 as the lead reference in this rejection. Applicants filed a response to this non-final rejection on July 27, 2005. None of the claims were amended in this response.

On September 23, 2005, the Examiner issued a final rejection of claims 1 - 20 on the basis of the same references and for the same reasons set forth in the June 6, 2005 Office Action. Applicants filed a Notice of Appeal on January 16, 2006. No further amendments have been made to the claims subsequent to the September 23, 2005 Final Rejection.

Thus, claims 1 - 20, as amended, remain pending in this application. Claims 1 - 20 have been finally rejected. Claims 1, 7, 12, and 18 are in independent form. Claims 2 - 6, 8 - 11, 13 - 17, and 19 - 20 are ultimately dependent upon these independent claims, respectively. The dependent claims stand or fall with the independent claims in this case.

SUMMARY OF THE CLAIMED SUBJECT MATTER

The present application is a continuation-in-part of U.S. Patent No. 6,923,153 which is directed toward a piston and connecting rod assembly having phosphatized bushingless connecting rod and profiled piston pin. The '153 patent issued on August 2, 2005. As a continuation-in-part, the present application includes narrower claims than those that issued in the '153 patent. More specifically, the present invention, as defined in independent claim 1, is directed toward a piston and connecting rod assembly for use with an internal combustion engine. The assembly includes a piston 22 having a body 46 including a pin bore 54 and a connecting rod 24 to interconnect the piston 22 and a crankshaft 28 (§ 31, pg. 9 - 10, Figs. 1 - 8). The connecting rod 24 has first and second ends 62, 64 with at least one of the ends 62 including a bore 66 extending therethrough and adapted to be aligned with the pin bore 54 within a piston 22. The assembly further includes a pin 26 that is received through the aligned pin bore 54 of the piston 22 and the bore 66 extending through the end 62 of the connecting rod 24. Each of independent claims 1, 7, 12, and 18 clarify that the pin 26 includes a pair of distal ends 56, 58, a center portion 60 formed therebetween and a *smoothly profiled outer circumference* that is substantially circular in cross-section with a larger diameter at the distal ends 56, 58 than at the center portion 60. In addition, each of independent claims 1, 7, 12, and 18 clarify that the outer circumference of the pin 26 *gradually tapers from the distal ends to the center portion* (§ 32, pg. 10, Figs. 3 and 6). The end 62 of the connecting rod 24 that is aligned with the piston pin bore 54 includes a phosphatized coating to facilitate relative angular movement between the bore extending through the connecting rod and the outer circumference of the profiled piston pin. The phosphatized coating has a thickness between two and less than eight microns (§ 37, pg. 12 - 13).

In addition, the present invention, as defined in independent claim 7, is directed toward a piston and connecting rod assembly as described above where the smoothly profiled outer circumference of the pin 26 includes a phosphatized coating having a thickness between two and less than eight microns (§ 41, pg. 14).

The present invention as defined in independent claim 12 is also directed toward a piston and connecting rod assembly for use with an internal combustion engine. The connecting rod 24 includes an internal gallery 67 extending between the first and second ends 62, 64 to direct lubricant therebetween (§ 36, pg. 12). The end 62 of the connecting rod 24 that is aligned with the piston pin bore 54 includes a phosphatized coating to facilitate relative angular movement between the bore extending through the connecting rod and the outer circumference of the smoothly profiled piston pin 26. Similarly, the present invention as defined in independent claim 18 is directed toward a piston and connecting rod assembly as described above where the smoothly profiled outer circumference of the pin 26 includes a phosphatized coating. Like the assembly described in claim 12, the connecting rod includes an internal gallery extending between the first and second ends to direct lubricant therebetween (§ 36, pg. 12).

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1, 2, 4-8, 11-13, 15 and 16 were finally rejected under 35 U.S.C. § 103(a) as being unpatentable over JP2-100821 in view of the Hart et al. '457 patent. Similarly, claims 10 and 14 were finally rejected under 35 U.S.C. § 103(a) as being unpatentable over JP2-100821 in view of the Hart et al. '457 patent as applied to claims 1, 2, 4-8, 11-13, 15 and 16 and further in view of the Fangman '929 patent. Claim 17 was also finally rejected under 35 U.S.C. § 103(a) as being unpatentable over JP2-100821 in view of the Hart et al. '457 patent as applied to claims

1, 2, 4-8, 11-13, 15 and 16 and further in view of the DeBiasse '544 patent. Additionally, claims 3, 9 and 18-20 were also finally rejected under 35 U.S.C. § 103(a) as being unpatentable over JP2-100821 in view of the Heart et al. '457 patent as applied to claims 1, 2, 4-8, 11-13, 15 and 16 and further in view of the Lindstrom '285 patent.

ISSUES

A. 35 U.S.C. § 103

The issue pending in this appeal is whether the invention described in claims 1 - 20 is obvious and therefore unpatentable under 35 U.S.C. § 103(a) over JP2-100821 in view of U.S. Patent No. 6,557,457 to Hart et al.; U.S. Patent No. 3,479,929 to Fangman; U.S. Patent No. 4,984,544 to DeBiasse; and U.S. Patent No. 5,039,285 issued to Lindstrom.

ARGUMENT

A. The Examiner's Rejection

In the final rejection dated September 23, 2005, the Examination stated:

Claims 1, 2, 4-8, 11-13, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP2-1 00821 in view of Hart et al (6,557,457). Note a piston 2, connecting rod 3, and a piston pin 1 a having a smoothly profiled outer circumference that is substantially circular in cross section with a larger diameter at the distal ends than at the center portion, which tapers gradually from the distal ends to the center portion. JP2-100821 shows everything except the end of the connecting rod aligned with the piston bore including a phosphatized coating that is adapted to facilitate relative angular movement between the bore extending through the connecting rod and the outer circumference of the piston pin. Hart et al teach that it is old in the art to provide a phosphatized coating on at least one of the running surfaces of the wrist pin, connecting rod bore and piston pin bores (see abstract and column 2, lines 47-60). It would have been obvious to one having ordinary skill in the art to modify JP2-100821 by providing a phosphatized coating on

the inside surface of the connecting rod bore and piston pin bore and/or the outside surface of the piston pin in lieu of a conventional bushing usually pressed into the connecting rod bore, **in order provide the necessary tribological properties therebetween, more simply and inexpensively.** In addition, Hart et al show a slightly different range of thickness of phosphate coating than applicant's, i.e. applicant claims a range of 2 to 8 micrometers, and Hart et al show an overlapping range of 8 to 15 micrometers. According to MPEP 2144.05 (1), a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties.

Claims 10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP2-1 00821 in view of Hart et al (6,557,457) as applied to claims 1, 2, 4-8, 11-13, 15, and 16 above, and further in view of Fangman (3,479,929). JP2-100821 in view of Hart et al show everything except employing a tapering connecting rod and bore housing. Fangman teaches that it is old in the art to provide a tapering connecting rod and bore housing. It would have been obvious to one having ordinary skill in the art to modify Loughlin in view of Hart by providing a tapering connecting rod and bore housing, **in order to reduce the mass of the rod, while maintaining surface area connection between piston and rod (see column 1, lines 19-25 of Fangman).**

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP2-100821 in view of Hart et al (6,557,457) as applied to claims 1, 2, 4-8, 11-13, 15, and 16 above, and further in view of DeBiasse (4,984,544). JP2-100821 in view of Hart teach everything except providing side relief channels along the inner circumference of the pin bore. DeBiasse teaches that it is old in the art to provide side relief channels 68 along the inner circumference of the pin bore. It would have been obvious to one having ordinary skill in the art to modify JP2-100821 in view of Hart et al by providing side relief channels, **in order to accumulate lubricating oil to lubricate between the surfaces of the pin and bore.**

Claims 3, 9, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP2-100821 in view of Hart et al (6,557,457) as applied to claims 1, 2, 4-8, 11-13, 15, and 16 above, and further in view of Lindstrom (5,039,285). JP2-100821 in view of Hart et al show everything except an internal gallery between the first and second ends of the connecting rod to direct lubricant between said first and second ends. Lindstrom teaches that it is old in the art to provide an internal gallery 66 between first and second

ends of the connecting rod 42 to direct lubricant between said first and second ends. It would have been obvious to one having ordinary skill in the art to modify JP2-100821 in view of Hart et al by employing an internal gallery in the connecting rod **to facilitate lubrication of the piston pin and crankshaft.** (Emphasis in original.)

Applicants respectfully submit that the final rejection of the claims pending in this case is based on hindsight and relies on improper reconstruction of the prior art, without any motivation in the art to do so. For these reasons as explained in greater detail below, applicants respectfully seek reversal of the final rejection of claims 1 - 20 pending in this case.

B. The Prior Art

1. JP2-100821

The Japanese JP-100821 patent has no English translation. At page 2 of the September 23, 2005 Office Action, the Examiner asserts this Japanese Patent shows certain features: “Note a piston 2, connecting rod 3, and a piston pin 1a having a smoothly profiled outer circumference that is substantially circular in cross section with a larger diameter at the distal ends than at the center portion, which tapers gradually from the distal ends to the center portion.” The Examiner further asserts, “JP2-100821 does utilize a bushing for the piston pin, as is conventional in the art, but does not rely upon the piston pin for patentability.” *Id.* at 5. Applicants respectfully note that the *patentability in Japan* of the device disclosed in the JP2-100821 patent has no place in the analysis before this tribunal. Moreover, applicants cannot agree with the Examiner’s interpretation of the JP2 ‘821 reference.

Referring specifically to the figures, the JP2-100821 patent discloses a connecting rod and multi-part piston pin. In one embodiment, the JP2-100821 patent teaches a connecting rod having a *bushing* and a *multi-part piston pin* assembly. The multi-part piston pin assembly

includes a substantially cylindrical center portion 4 having a *uniform outer diameter* that is surrounded by a cylindrical bushing. Obviously, given this structure, the center portion 4 is not tapered. The assembly further includes a pair of frusto-conically shaped end portions that appear to rotationally fix the piston pin relative to the piston. At least one of the frusto-conically shaped end portions is distinct from the cylindrical center portion. Each end portion is held in place via end caps. (Figs. 1 and 4). The other embodiment includes a *multi-part piston pin* including a center portion *having a cylindrically uniform outer diameter* and end caps adjacent the distal ends of the center portion (Fig. 6). To the extent that the Examiner disputed this understanding of what JP2-100821 teaches, applicants respectfully requested an English translation of this reference. *Ex parte Jones*, 62 USPQ2d 1206; See also MPEP 700-21. No translation of this reference has been provided.

In any event, applicants respectfully submit that JP2-100821 neither discloses nor suggests a bushingless connecting rod including a phosphatized coating to facilitate relative angular movement between the connecting rod and a profiled piston pin as required by independent claim 1. Nor does JP2-100821 disclose or suggest a piston pin having a smoothly profiled outer circumference that tapers gradually from the distal ends to the center portion and that includes a phosphatized coating as required by independent claims 1, 7, 12, and 18. Rather, the Japanese pin has a uniform cylindrical outer diameter that extends between a pair of separate end portions. Moreover, JP2-100821 neither discloses nor suggests the combination of a piston pin having a profiled outer circumference and a bushingless connecting rod having a first end, a second end and an internal gallery fixedly therebetween to direct lubricant between the first and second ends as required by independent claims 12 and 18.

2. The Hart et al. '457 patent

The Hart et al. '457 patent discloses a bushingless piston and connecting rod assembly coupled by a wrist pin. Both the assembly and the wrist pin include a running surface, where at least one of these running surfaces includes a manganese phosphate coating. The Hart et al. '457 patent employs a manganese phosphate coating 36 in lieu of a bushing within heavy-duty diesel engines where the tribological properties of the diesel engine tend to corrode traditional bushings and to more directly place the load during operation onto the parent materials of the connecting rod and wrist pin. The manganese phosphate coating 36 includes a thickness of about 8.0 to 15.0 μm , an application weight of about $2.15 \pm 1.08 \text{ mg/cm}^2$, and a grain size of about $30 \pm 15 \mu\text{m}$. The manganese phosphate coating 36 is applied to the running surface 34 of the wrist pin 32 to act on the steel running surfaces 22 and 30 of the piston body 12 and connecting rod 24, respectively (Figs. 1-2). Alternatively, the manganese phosphate coating 136 is applied to the running surface 122 of the piston body 112 or the running surface 130 of the connecting rod 124 to act on the steel running surface 134 of the wrist pin (Fig. 3).

However, the Hart et al. '457 patent does not make up for the deficiencies of JP2-100821. Specifically, the Hart et al. '457 patent does not disclose or suggest the use of a *smoothly profiled piston pin* having an outer circumference that is substantially circular in cross-section with a larger diameter at the distal ends than at the center portion and that *gradually tapers from the distal ends to the center portion* as required by claims 1, 7, 12, and 18. Nor does Hart et al. disclose or suggest such a pin used in connection with a connecting rod including a phosphatized coating having a thickness between two and less than eight microns as required by independent claims 1 and 7. Rather, the Hart et al. '457 patent teaches away from the present invention by arguing the importance of a manganese phosphate coating having a thickness

between 8.0 to 15.0 μm (Column 3, lines 9-12). Furthermore, the Hart et al. '457 patent neither discloses nor suggests a connecting rod having an internal gallery to direct lubricant between the first and second ends of the connecting rod as required by independent claims 12 and 18.

3. The Fangman '929 patent

The Fangman '929 Patent discloses a piston pin having an arcuate upper and lower surface joined by concave surfaces along the length and across the ends thereof. Specifically, the Fangman '929 patent teaches a piston 17 having an I-beam shape and a piston rod shaped in such a way as to suitably receive the piston pin 17. However, the Fangman '929 patent does not make up for the deficiencies of JP2-100821 and the Heart et al. '457 patent.

The Fangman '929 patent does not disclose or suggest a bushingless connecting rod including a phosphatized coating to facilitate relative angular movement between the connecting rod and a profiled piston pin as required by independent claim 1. Nor does the Fangman '929 patent disclose or suggest a piston pin having a smoothly profiled outer circumference that tapers gradually from the distal ends to the center portion and that includes a phosphatized coating as required by independent claims 1, 7, 12, and 18. Moreover, the Fangman '929 patent neither discloses nor suggests the combination of a piston pin having a profiled outer circumference and a bushingless connecting rod having a first end, a second end and an internal gallery fixedly therebetween to direct lubricant between the first and second ends as required by independent claims 12 and 18.

4. The DeBiasse '544 patent

The DeBiasse '544 patent discloses a lubricating means for relatively rotatable engine parts connected by a pin. Specifically, the DeBiasse '544 patent discloses a piston 12 and piston rod 16 connected by a pin 60. The piston 12 includes bores 54 and 56 and the piston rod 16 includes a bore 58 to receive the pin 60. Each of the bores 54 and 56 include recesses 68 and 70 to form pockets of oil along the surfaces between the wrist pin 60 and the bores 54 and 56. The piston 12 may also include tangential ducts 72 and 74 to supply oil to the surfaces between the wrist pin 60 and the bores 54 and 56.

However the DeBiasse '544 patent does not disclose or suggest a bushingless connecting rod including a phosphatized coating to facilitate relative angular movement between the connecting rod and a profiled piston pin as required by independent claim 1. Nor does the DeBiasse '544 patent disclose or suggest a piston pin having a smoothly profiled outer circumference that tapers gradually from the distal ends to the center portion and that includes a phosphatized coating as required by independent claims 1, 7, 12, and 18. Moreover, the DeBiasse '544 patent neither discloses nor suggests the combination of a piston pin having a profiled outer circumference and a bushingless connecting rod having a first end, a second end and an internal gallery fixedly therebetween to direct lubricant between the first and second ends as required by independent claims 12 and 18.

5. The Lindstrom '285 patent

The Lindstrom '285 patent discloses a lubrication system for a connecting rod 42, piston 44, and wrist pin 46 used in a hermetic refrigeration compressor motor 8. The Lindstrom connecting rod 42 has three oil ports 64, 66, 68 to direct oil toward the inner surfaces 72, 77 of

the piston 44 and piston crown 60, respectively, as well as toward the wrist pin 46 during operational movement of the connecting rod 42 within the cylinder 14 of a hermetic refrigeration compressor motor 8.

However, the Lindstrom '285 patent does not disclose or suggest a bushingless connecting rod including a phosphatized coating to facilitate relative angular movement between the connecting rod and a profiled piston pin as required by independent claim 1. Nor does the Lindstrom '285 patent disclose or suggest a piston pin having a smoothly profiled outer circumference that tapers gradually from the distal ends to the center portion and that includes a phosphatized coating as required by independent claims 1, 7, 12, and 18. Moreover, the Lindstrom '285 patent neither discloses nor suggests the combination of a piston pin having a profiled outer circumference and a bushingless connecting rod having a first end, a second end and an internal gallery fixedly therebetween to direct lubricant between the first and second ends as required by independent claims 12 and 18.

6. The Uehara et al. '518 and Kagohara et al. '918 patents

The Uehara et al. '518 patent is cited as disclosing a thickness of phosphate coating of 2 to 8 micrometers. The Kagohara et al. '918 patent is cited as disclosing a thickness of phosphate coating of 2 to 30 micrometers. The Examiner cites these patents as evidence that a particular coating depth does not provide a patentable distinction over the prior art. However, these patents do not make up for the deficiencies of the JP2-100821, Heart et al. '457, Fangman '929, DeBiasse '544 and Lindstrom '285 patents. Specifically, the Uehara et al. '518 patent teaches applying a phosphate coating as part of an anti-rust treatment to rotating brake members of a braking device. The Kagohara et al. '918 patent teaches the application of a phosphate coating

as part of a multi-layer sliding bearing, which also includes a thermally conductive coating, a back metal layer and a sliding layer. Neither of these applications has any bearing on the problems solved by the piston and connecting rod assembly of the present invention.

7. The present invention

In contrast to the references of record in this case, the present invention, as defined in independent claim 1, is directed toward a piston and connecting rod assembly for use with an internal combustion engine. The assembly includes a piston having a body including a pin bore and a connecting rod to interconnect the piston and a crankshaft. The connecting rod has first and second ends with at least one of the ends including a bore extending therethrough and adapted to be aligned with the pin bore within a piston. The assembly further includes a pin that is received through the aligned pin bore of the piston and the bore extending through the end of the connecting rod. Each of independent claims 1, 7, 12, and 18 clarify that the pin includes a pair of distal ends, a center portion formed therebetween and a *smoothly profiled outer circumference* that is substantially circular in cross-section with a larger diameter at the distal ends than at the center portion. In addition, each of independent claims 1, 7, 12, and 18 clarify that the outer circumference of the pin *gradually tapers from the distal ends to the center portion*. The end of the connecting rod that is aligned with the piston pin bore includes a phosphatized coating to facilitate relative angular movement between the bore extending through the connecting rod and the outer circumference of the profiled piston pin. The phosphatized coating has a thickness between two and less than eight microns. In addition, the present invention, as defined in independent claim 7, is directed toward a piston and connecting rod

assembly as described above where the smoothly profiled outer circumference of the pin includes a phosphatized coating having a thickness between two and less than eight microns.

The present invention as defined in independent claim 12 is also directed toward a piston and connecting rod assembly for use with an internal combustion engine. The connecting rod includes an internal gallery extending between the first and second ends to direct lubricant therebetween. The end of the connecting rod that is aligned with the piston pin bore includes a phosphatized coating to facilitate relative angular movement between the bore extending through the connecting rod and the outer circumference of the profiled piston pin. Similarly, the present invention as defined in independent claim 18 is directed toward a piston and connecting rod assembly as described above where the smoothly profiled outer circumference of the pin includes a phosphatized coating.

C. Discussion

- 1. The invention described in independent claims 1, 7, 12, and 18 is not obvious in view of the prior art. The remaining claims are all dependent on the independent claims and are also patentable.**

The language of each of independent claims 1, 7, 12 and 18 is narrower than either independent claim of the parent '153 patent that was issued by the Office on August 2, 2005. Since the claims of the '153 patent clearly meet the standards for patentability, it stands to reason that the more narrow claims of the present application should also be allowed. Furthermore, and as explained in greater detail below, applicants respectfully submit that these independent claims, as well as those dependent thereon, are not obvious in view of the prior art of record in this case.

More specifically, a rejection based on §103 must rest on a factual basis, with the facts being interpreted without a hindsight reconstruction of the invention from the prior art. Thus, in

the context of an analysis under § 103, it is not sufficient merely to identify one reference that teaches several of the limitations of a claim and another that teaches several limitations of a claim to support a rejection based on obviousness. This is because obviousness is not established by combining the basic disclosures of the prior art to produce the claimed invention absent a teaching or suggestion that the combination be made. Interconnect Planning Corp. v. Fiel, 774 F.2d 1132, 1143, 227 U.S.P.Q. (BNA) 543, 551 (Fed. Cir. 1985); In Re Corkhill, 771 F.2d 1496, 1501-02, 226 U.S.P.Q. (BNA) 1005, 1009-10 (Fed. Cir. 1985). The relevant analysis invokes a cornerstone principle of patent law:

That all elements of an invention may have been old (the normal situation), or some old and some new, or all new, is however, simply irrelevant. Virtually all inventions are combinations and virtually all are combinations of old elements. Environmental Designs v. Union Oil Co. of Cal., 713 F.2d 693, 698 (Fed. Cir. 1983) (other citations omitted).

A patentable invention . . . may result even if the inventor has, in effect, merely combined features, old in the art, for their known purpose without producing anything beyond the results inherent in their use. American Hoist & Derek Co. v. Sowa & Sons, Inc., 220 U.S.P.Q. (BNA) 763, 771 (Fed. Cir. 1984) (emphasis in original, other citations omitted).

As the Court of Appeals for the Federal Circuit has noted in the past, “[w]hen a rejection depends upon a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references.” Ecolochem, Inc. v. Southern Calif. Edison, 56 U.S.P.Q. 2d 1065, 1073 (Fed. Cir. 2000). Specifically, the Examiner must show that a person of ordinary skill in the art must not only have had some motivation to combine the prior art teachings, but some motivation to combine the prior art teachings *in the particular manner claimed*. In re Kotzab, 217 F.3d 1365, 1371 (Fed. Cir. 2000) (emphasis added).

The Examiner has identified the alleged motivation to combine references with the use of bold face type. (See pg. 5, September 23, 2005 Office Action.) However, the alleged motivation supplied by the Examiner cannot be found in the references and is simply a conclusory interpretation of what the references teach. For example, the Examiner asserts that there is motivation to combine the Hart et al. and the JP2 '821 patents, stating, "So, *the ability* of the Hart et al. reference to provide a solution to this problem *that could be utilized* by JP2-100821 to its advantage is a reasonable motivation to combine the Hart et al. reference with JP2-100821." (Pg. 5 - 6, September 23, 2005 Office Action. Emphasis added.) Applicants respectfully submit that this reasoning is flawed. Moreover, the Examiner has not cited any language from JP2-100821 that would suggest a motivation to combine it with Heart et al. Rather, the Examiner simply concludes that the problem addressed by JP2-100821 is the same as the problem addressed by Heart et al. (i.e. reducing mass by eliminating a bushing). Yet, JP2-100821 teaches a bushing and multi-part pin, both of which add mass and maintain conventionally known lubrication characteristics. Clearly, Heart et al. teaches away from JP2-10081 by disclosing the use a manganese phosphate coating applied to running surfaces of a steel piston assembly. In short, the Examiner's position embodies classically improper hindsight reasoning.

There is simply no motivation to combine JP2-100821 with the Hart et al. '457 patent. More specifically, there is no motivation to combine these prior art references in the manner claimed by the present invention. Furthermore, there is no motivation to combine JP2-100821 and Heart et al. '457 with the Fangman '929, DeBiasse '544 and Lindstrom '285 patents. Even assuming that such a motivation existed, a combination of these references would not result in the piston and connecting rod assembly of the type described in independent claims 1, 7, 12 and 18.

It is respectfully submitted that JP2-100821, the Hart et al., Fangman, DeBiasse and Lindstrom patents references skirt around, but do not suggest the claimed invention *as a whole*. See Hybritech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 1383 (Fed. Cir. 1986). Further, it is respectfully submitted that one must pick and choose elements from the structurally dissimilar devices disclosed in JP2-100821, the Hart et al., Fangman, Debiasse, and Lindstrom patents and combine these elements by restructuring them, using hindsight and the applicants' own disclosure, to conclude that the claimed invention is obvious. Applicants respectfully submit that this would be improper in view of the disclosures of the prior art.

There is a fundamental axiom in patent law that if a reference must be reconstructed or rearranged to change its operation to meet the applicants' claim, that modification of the reference is inappropriate and cannot stand. JP2-100821 discloses *a multi-part pin* for assembling a piston and connecting rod and also employs *a bushing* to facilitate contact between the connecting rod and a contoured pin. On the other hand, the Hart et al. '457 patent *teaches away from using a bushing* and discloses using a manganese phosphate coating having a thickness of between 8 and 15 μm in lieu thereof in connection with a unitary wrist pin. This is entirely contrary to the use of a multi-part wrist pin and bushing taught by JP2-100821. Accordingly, the teachings of JP2-100821 and the Hart et al. patent are diametrically opposed and would have to be reconstructed or rearranged to change their operations if they were to be combined.

Furthermore, the Hart et al. '457 patent *expressly discusses and claims* the coating thickness between 8 and 15 microns. (See col. 3, ll. 7 - 12 and col. 4 - 5, claims 3, 16, and 20, Hart et al. '457 patent.) Thus, the Examiner's assertion that Hart does not argue the importance of the coating thickness is simply incorrect. Hart et al. claimed this feature, thus, by definition it

is important to the invention. Moreover, the applicants contend that the coating thickness disclosed by the Hart et al. '457 patent is excessive and therefore does not have the same properties as a coating thickness between less than 8 and 2 microns. (See ¶¶ [0009] - [0011], pg. 3 - 4 of the present application.) Uehara et al. '518 provides support for Applicants' position that different coating thicknesses provide different properties. (See Uehara et al. '518, Column 2, Lines 57-63.)

However, unlike the field of braking systems to which Uehara et al. is directed, the tolerances between the components that comprise the small end pivot point (i.e. the small end pin bore, piston pin and piston pin bore) are critical for maintaining acceptable engine life. Specifically, the situation of adjusting the thickness range relative to the size of the piston-engine as suggested by the Examiner is not practical due to the importance of tolerances at this pivot point. To do so would reduce the reliability of this pivot point and the engine as a whole. Thus, given the disproportionate hardness between the coating and the metals along the pivot point, a thickness coating along this interface of 8 to 15 microns will wear and exceed these tolerances, resulting in vibration, engine noise and premature wear, which reduces the life of the engine.

Furthermore, the mass of the components along the pivot point must be reduced to account for a thickness coating between 8 and 15 microns. Thinner components along this pivot point are not as robust as those having more mass. Thus, a thickness coating between 8 and 15 microns, given the increased tolerances and reduced mass, acts to reduce reliability at this pivot point as well as the entire engine as a whole. On the other hand, independent claims 1 and 7 teach a manganese phosphate coating between two and less than eight microns. In contrast to the teachings of Hart et al., when a manganese phosphate coating thickness between two and less than eight microns begins to wear, the tolerance increase between the engine components does

not result in significant vibration, engine noise or premature wear and thus, does not affect the life of the engine.

Additionally, neither the Hart et al. '475 nor JP2-100821 patents teach or suggest the use of a *smoothly profiled piston pin* that is substantially circular in cross-section with a larger diameter at its distal ends than at its center portion and that *tapers gradually from the distal ends to the center portion* as required in each of independent claims 1, 7, 12, and 18. Likewise, the Hart et al. '475 patent and JP2-100821 do not teach or suggest this structure in combination with a connecting rod having an internal gallery as required by independent claims 12 and 18.

On the other hand, the Lindstrom '285 patent teaches the use of a wrist pin having an annular groove and an internal, axial passage. This bears no relation to the combination of a smoothly profiled piston pin and a bushingless connecting rod including a phosphatized coating for use within an internal combustion engine as required by independent claims 1 and 12. The DeBiasse '544, Fangman '929, Kagohara et al. '918 and Uechara et al. '518 patents do not make up for the deficiencies of the JP2-100821, Hart et al. '457 and Lindstrom '285 patents nor do they suggest the subject invention. Thus, applicants respectfully submit that the disclosures of each of these references would have to be improperly modified to meet the limitations of independent claims 1, 7, 12 and 18.

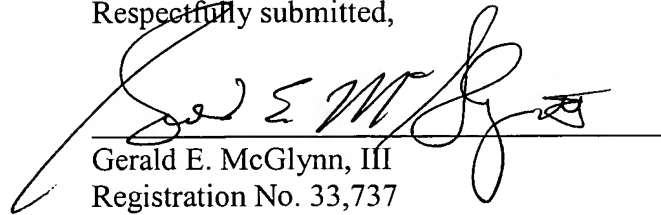
Claims 2 – 6, 8 – 11, 13 – 17, 19 and 20 are all ultimately dependent upon independent claims 1, 7, 12 and 18, respectively, and add further perfecting limitations. However, even if they did, they could only be applied through hindsight after restructuring the disclosure of the prior art in view of applicants' invention. A combination of the prior art in this way to derive applicants' invention would, in and of itself, be an invention.

CONCLUSION

In view of the above, it is respectfully submitted that claims 1 - 20 recite structure that is not disclosed or suggested by the prior art and that is patentably distinguishable from the subject matter of the references of record in this case. As such, the prior art references do not suggest the subject invention. However, even if they did, they could only be applied through hindsight after restructuring the disclosure of the prior art in view of applicants' invention. A rearrangement of the pistons and connecting rods described in the references to derive applicants' invention would, in and of itself, be an invention.

Applicants respectfully submit that the claims presently pending in this appeal clearly distinguish over the prior art and are therefore allowable. Accordingly, applicants respectfully solicit a reversal of the final rejection and the allowance of the claims pending in this case.

Respectfully submitted,



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CLAIMS APPENDIX

1. A piston and connecting rod assembly for use with an internal combustion engine, said assembly comprising:

a piston adapted for reciprocal movement within a cylinder of the internal combustion engine, said piston having a body including a pin bore formed therein;

a connecting rod adapted to interconnect said piston and a crankshaft so as to translate the reciprocal movement of the piston into rotational movement of the crankshaft, said connecting rod having first and second ends with at least one of said ends including a bore extending therethrough and adapted to be aligned with said pin bore in said piston;

a pin adapted to be operatively received through said aligned pin bore in said piston and said bore extending through said end of said connecting rod, said pin including a pair of distal ends, a center portion formed therebetween and a smoothly profiled outer circumference that is substantially circular in cross-section with a larger diameter at said distal ends than at said center portion and tapers gradually from said distal ends to said center portions; and

said end of said connecting rod aligned with said piston pin bore including a phosphatized coating that is adapted to facilitate relative angular movement between said bore extending through said connecting rod and said outer circumference of said profiled piston pin thereby facilitating reciprocal motion of said piston relative to the cylinder of an internal combustion engine, said phosphatized coating having a thickness between two and less than eight microns.

2. The assembly as set forth in claim 1 wherein said bore extending through said end of said connecting rod defines an inner circumference, said phosphatized coating is bonded to said inner circumference so as to be interposed between said inner circumference and said pin.

3. The assembly as set forth in claim 1 wherein said connecting rod further includes an internal gallery juxtaposed between said first and second ends to direct lubricant between said first and second ends.

4. The assembly as set forth in claim 1 wherein said connecting rod includes a terminal end and a bore housing depending therefrom wherein said bore housing tapers inwardly toward said terminal end.

5. The assembly as set forth in claim 1 wherein said pin includes a phosphatized coating disposed about said profiled outer circumference.

6. The assembly as set forth in claim 1 wherein said pin bore in said piston body defines an inner circumference including a phosphatized coating interposed between said inner circumference and said pin.

7. A piston and connecting rod assembly for use with an internal combustion engine, said assembly comprising:

a piston adapted for reciprocal movement within a cylinder of the internal combustion engine, said piston having a body including a pin bore formed therein;

a connecting rod adapted to interconnect said piston and a crankshaft so as to translate the reciprocal movement of the piston into rotational movement of the crankshaft, said connecting rod having first and second ends with at least one of said ends including a bore extending therethrough and adapted to be aligned with said pin bore in said piston;

a pin adapted to be operatively received through said aligned pin bore in said piston and said bore extending through said end of said connecting rod, said pin including a pair of distal ends, a center portion formed therebetween and a smoothly profiled outer circumference that is substantially circular in cross-section with a larger diameter at said distal ends than at said center portion and tapers gradually from said distal ends to said center portions, said profiled outer circumference having a phosphatized coating bonded thereto to facilitate relative angular movement between said bore extending through said connecting rod and said outer circumference of said profiled piston pin thereby facilitating reciprocal motion of said piston relative to the cylinder of an internal combustion engine, said phosphatized coating having a thickness between two and less than eight microns.

8. The assembly as set forth in claim 7 wherein said bore extending through said end of said connecting rod defines an inner circumference having a phosphatized coating bonded thereto, said Phosphatized coating interposed between said inner circumference of said bore and said outer circumference of said profiled piston pin.

9. The assembly as set forth in claim 7 wherein said connecting rod further includes an internal gallery fixedly between said first and second ends and adapted to direct lubricant between said first and second ends.

10. The assembly as set forth in claim 7 wherein said end of said connecting rod includes a terminal end and a bore housing depending therefrom wherein said bore housing tapers inwardly toward said terminal end.

11. The assembly as set forth in claim 7 wherein said pin bore of said piston body defines an inner circumference having a phosphatized coating between said inner circumference and said pin.

12. A piston and connecting rod assembly for use with an internal combustion engine, said assembly comprising:

a piston adapted for reciprocal movement within a cylinder of the internal combustion engine, said piston having a body including a pin bore formed therein;

a connecting rod adapted to interconnect said piston and a crankshaft so as to translate the reciprocal movement of the piston into rotational movement of the crankshaft, said connecting rod having first and second ends with at least one of said ends including a bore extending therethrough and adapted to be aligned with said pin bore in said piston, said connecting rod having an internal gallery fixedly between said first and second ends to direct lubricant between said first and second ends;

a pin adapted to be operatively received through said aligned pin bore in said piston and said bore extending through said end of said connecting rod, said pin including a pair of distal ends, a center portion formed therebetween and a smoothly profiled outer circumference that is

substantially circular in cross-section with a larger diameter at said distal ends than at said center portion and tapers gradually from said distal ends to said center portions; and

said end of said connecting rod aligned with said piston pin bore including a phosphatized coating that is adapted to facilitate relative angular movement between said bore extending through said connecting rod and said outer circumference of said profiled piston pin thereby facilitating reciprocal motion of said piston relative to the cylinder of an internal combustion engine.

13. The assembly as set forth in claim 12 wherein said bore extending through said end of said connecting rod defines an inner circumference, said phosphatized coating is bonded to said inner circumference so as to be interposed between said inner circumference and said pin, said phosphatized coating having a thickness between two and less than eight microns.

14. The assembly as set forth in claim 12 wherein said connecting rod includes a terminal end and a bore housing depending therefrom wherein said bore housing tapers inwardly toward said terminal end.

15. The assembly as set forth in claim 12 wherein said pin includes a phosphatized coating disposed about said profiled outer circumference.

16. The assembly as set forth in claim 12 wherein said pin bore in said piston body defines an inner circumference including a phosphatized coating interposed between said inner circumference and said pin.

17. The assembly as set forth in claim 12 wherein said pin bore of said piston pin bore includes an inner circumference having side relief channels adapted to receive lubrication between said pin and said inner circumference of said piston pin bore.

18. A piston and connecting rod assembly for use with an internal combustion engine, said assembly comprising:

a piston adapted for reciprocal movement within a cylinder of the internal combustion engine, said piston having a body including a pin bore formed therein;

a connecting rod adapted to interconnect said piston and a crankshaft so as to translate the reciprocal movement of the piston into rotational movement of the crankshaft, said connecting rod having first and second ends with at least one of said ends including a bore extending therethrough and adapted to be aligned with said pin bore in said piston, said connecting rod having an internal gallery fixedly between said first and second ends to direct lubricant between said first and second ends; and

a pin adapted to be operatively received through said aligned pin bore in said piston and said bore extending through said end of said connecting rod, said pin including a pair of distal ends, a center portion formed therebetween and a smoothly profiled outer circumference that is substantially circular in cross-section with a larger diameter at said distal ends than at said center portion and tapers gradually from said distal ends to said center portions, said profiled outer circumference having a phosphatized coating bonded thereto.

19. The assembly as set forth in claim 18 wherein said phosphatized coating bonded to said profiled outer circumference having a thickness between two and less than eight microns.

20. The assembly as set forth in claim 18 wherein said bore extending through said end of said connecting rod defines an inner circumference, said inner circumference including a phosphatized coating is bonded to said inner circumference so as to be interposed between said inner circumference and said pin.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.